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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,861	03/30/2004	Thomas Hubert Van Steenkiste	DP-308959	3460

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EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/812,861	VAN STEENKISTE ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 04 October 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-9,11-18 and 20-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 10 and 19 are canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The appeal brief of October 4, 2005 has been received and considered. The Examiner notes that previous claim 10 has been written into claim 1 and previous claim 19 has been written into claim 12, leaving claims 1-9, 11-18 and 20-22 present for examination.

2. In view of the Appeal Brief filed on October 4, 2005, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER

Priority

3. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. However, the provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claims 1-22 of this application. The provisional application does not indicate (1) that the mask is pressed against the plastic type material as required by claim 1, part d) and (2) that the particle size can be 250 to 1400 microns as required by claim 12, and (3) that the traverse speed should be 70 to 260 mm/sec as now required by claims 1 and 12 (the priority document only discloses 25-250 mm/sec in paragraph [0032], not the presently claimed range). Therefore, as to claims 1-9, 11-18 and 20-22, priority only extends to the filing date of the U.S. application, March 30, 2004.

Claims

4. The Examiner notes that claim 1, part f) and claim 12, part e) now require the "kinetic spraying of the particles". The Examiner understands by "kinetic spraying" that applicant means that a kinetic spray process as described in paragraph [0004] of the specification is performed, whereby the particles are accelerated to a velocity sufficient to adhere to the substrate but do not melt or thermally soften prior to impingement on the substrate. If applicant disagrees, he should so indicate on the record.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-6, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn (US 3731354) in view of Tawfik et al (US 2004/0101738), Van Steenkiste et al (US 6283386) (hereinafter Van Steenkiste '386), Hathaway (US 2599710) and McCane et al (US 6592947).

Rayburn teaches a method of spray coating a substrate covered by a plastic type material. Column 1, lines 50-60. Rayburn teaches making a rolled capacitor made from a two side metallized plastic dielectic material with thin coating of plastic material applied to head of the metallized layers for holding the capacitor together. Column 1, lines 50-60. After the capacitor is rolled, the plastic covered ends are sprayed with a high velocity spray of molten metal, preferably aluminum, which embeds itself in the plastic coatings between the metallized layers so as to contact the surface as well as the

ends of the electrodes, but does not substantially penetrate the dielectric strip substrate. Column 1, line 65 through column 2, line 10, column 7, line 65 through column 6, line 20 and figure 7. The metal spraying must be done at high velocity. Column 6, lines 5-10. This embedding in the plastic to the metal below would "remove" the plastic, as it would be, at the least, pushed out of the way of the metal in the area of application.

Claim 2: the particles can be aluminum. Column 6, lines 1-25.

Claim 3: the substrate can comprise electrical conductor material. Column 4, lines 40-60 (layers 14, 16).

Claim 4: the substrate can be a flexible electrical circuit. See column 5, lines 25-30 showing the flexibility of composite film 10.

Rayburn teaches all the features of these claims except (1) the kinetic spraying and its features and (2) the mask and its features.

However, Tawfik teaches that when spraying metal particles into a substrate to be embedded, it is desirable to use either thermal spraying or cold gas dynamic spraying (=kinetic spraying). See paragraphs [0014], [0016], [0022], [0043] and [0049]. The use of cold gas dynamic spraying prevents problems from overheating during coating from occurring. Paragraphs [0022] and [0049].

Van Steenkiste '386 notes that kinetic spraying and cold gas dynamic spraying are equivalent. Column1, lines 15-25. Van Steenkiste '386 also provides a desirable method of kinetic spraying of metals. Column 1, lines 55-60. Particle sizes can be in excess of 100 microns, up to 106 microns. Column 2, lines 20-30 and column 5, lines 45-

55. For spraying a supersonic nozzle having a converging region connected to a diverging region through a throat is provided. Figure 2 and column 3, lines 40-65. A flow of heated main gas is directed through the nozzle. Column 3, lines 30-40. The particles are entrained in the flow of the heated main gas and accelerated to a velocity sufficient to result in the particles impacting and adhering to the substrate. Column 1, line 55 through column 2, line 10. The particles can be aluminum. Column 5, lines 25-30. The velocity can be greater than 1000 m/s. Column 1, lines 60-68. The gas temperature can be 650 degrees C. Column 1, lines 60-68.

Hathaway teaches that when coating a substrate with sprayed metal, such as when making electrical wiring, it is known to apply a mask to both sides of the substrate to provide a pattern to be sprayed. See column 3, lines 40-70 and column 4, lines 10-25.

McCane teaches that when performing kinetic spraying, it is known that the thickness of the layer to be applied can be controlled by adjusting the gun traverse speed. Column 5, lines 10-20, column 3, lines 5-35 and column 4, lines 5-20. McCane also teaches that based on the material to be applied there is a critical velocity for application that is partly based on the nozzle standoff distance from the substrate surface. Column 3, lines 20-35.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn to use kinetic spraying as suggested by Tawfik in order to desirably embed particles in the plastic layer without overheating the

substrate, because Rayburn teaches thermally spraying metal particles to be embedded in a plastic layer on a substrate, and Tawfik teaches that when spraying metal particles to be embedded, it is desirable to use kinetic spraying to replace thermal spraying in order to prevent overheating of the substrate. It would further have been obvious to modify Rayburn in view of Tawfik to use the kinetic spraying features taught by Van Steenkiste '386 with an expectation of providing a desirably kinetic sprayed coating, because Rayburn in view of Tawfik suggests using kinetic spraying to provide the sprayed metal and Van Steenkiste '386 provides a desirable form of kinetic spraying to apply metal particles. It would further have been obvious to modify Rayburn in view of Tawfik and Van Steenkiste '386 to use the mask as suggested by Hathaway in order to provide coating to the specifically desired areas, because Rayburn in view of Tawfik and Van Steenkiste '386 teach applying a sprayed metal to a substrate and Hathaway teaches that when applying sprayed metal to a substrate, it is desirable to use an applied mask when a specific area is desirable to be sprayed. As to the further distance between the substrate and nozzle (claim 5) and traverse speed (claim 1), it would have been obvious to one of ordinary skill in the art to optimize the features when performing the process of Rayburn in view of Tawfik and Van Steenkiste '386 and Hathaway as suggested by McCane, because Van Steenkiste '386 provides spraying features for various sizes of particles and materials and McCane teaches that traverse speed in kinetic spraying can be adjusted to provide for a desirable coating thickness and nozzle standoff distance from the substrate should be based on the material to be

sprayed, and one would perform routine experimentation to optimize the positioning and speeds for the specific materials and purposes used.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane as applied to claims 1-6, 9 and 11 above, and further in view of Martyniak (US 4263341).

Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane teach all the features of this claim except the material of the mask.

However, Martyniak teaches that it is well known to use a mask of stainless steel, for example, when applying a sprayed metal coating to a substrate. Column 5, lines 5-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane to use a stainless steel mask as suggested by Martyniak with an expectation of providing a desirable mask for coating because Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane suggest using a mask when metal spray coating and Marytniak teaches that a desirable mask for metal spray coating is made from stainless steel.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane as applied to claims 1-6, 9 and 11 above, and further in view of Kashirin et al (US 6402050).

Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane teach all the features of this claim except entering the particles in the flow of gas at a point in the diverging region.

However, Kashirin teaches that in the art of cold gas dynamic spraying (kinetic spraying) it is desirable to provide the particles into the flow of gas at a point in the diverging region in order to reduce wear on the nozzle. Column 3, lines 1-25 and column 2, lines 1-20 and figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane to feed the particles into the diverging region as suggested by Kashirin with an expectation of providing a desirably less worn spray system because Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and McCane suggest using a kinetic spraying process and Kashirin teaches when kinetic spraying it is desirable to provide the powder in the diverging region to prevent wear on the nozzle.

10. Claims 12-16, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn (US 3731354) in view of Tawfik et al (US 2004/0101738) , Van Steenkiste (US 6623796) (hereinafter Van Steenkiste '796) and McCane et al (US 6592947).

Rayburn teaches a method of spray coating a substrate covered by a plastic type material. Column 1, lines 50-60. Rayburn teaches making a rolled capacitor made from a two side metallized plastic dielectic material with thin coating of plastic material applied to head of the metallized layers for holding the capacitor together. Column 1, lines 50-60. After the capacitor is rolled, the plastic covered ends are sprayed with a high velocity spray of molten metal, preferably aluminum, which embeds itself in the plastic coatings between the metallized layers so as to contact the surface as well as the ends of the electrodes, but does not substantially penetrate the dielectric strip substrate. Column 1, line 65 through column 2, line 10, column 7, line 65 through column 6, line 20 and figure 7. The metal spraying must be done at high velocity. Column 6, lines 5-10. This embedding in the plastic to the metal below would "remove" the plastic, as it would be, at the least, pushed out of the way of the metal in the area of application.

Claim 13: the particles can be aluminum. Column 6, lines 1-25.

Claim 14: the substrate can comprise electrical conductor material. Column 4, lines 40-60 (layers 14, 16).

Claim 15: the substrate can be a flexible electrical circuit. See column 5, lines 25-30 showing the flexibility of composite film 10.

Rayburn teaches all the features of these claims except the kinetic spraying and its features.

However, Tawfik teaches that when spraying metal particles into a substrate to be embedded, it is desirable to use either thermal spraying or cold gas dynamic

spraying (=kinetic spraying). See paragraphs [0014], [0016], [0022], [0043] and [0049]. The use of cold gas dynamic spraying prevents problems from overheating during coating from occurring. Paragraphs [0022] and [0049].

Van Steenkiste '796 notes that kinetic spraying and cold gas dynamic spraying are equivalent. Column 1, lines 20-30. Van Steenkiste '796 also provides a desirable method of kinetic spraying of metals. Column 2, lines 40-55. Particle sizes can be 250 microns in diameter. Column 2, lines 40-55. For spraying a supersonic nozzle having a converging region connected to a diverging region through a throat is provided. Figure 2 and column 3, line 45 through column 4, line 10. A flow of heated main gas is directed through the nozzle. Column 3, lines 40-55. The particles are entrained in the flow of the heated main gas and accelerated to a velocity sufficient to result in the particles impacting and adhering to the substrate. Column 2, lines 40-55. The particles can be metal. Column 4, lines 50-60. The velocity can be 300-1200 m/s. Column 5, lines 30-40. The gas temperature can be 1200 degrees F. Column 5, lines 50-55.

McCane teaches that when performing kinetic spraying, it is known that the thickness of the layer to be applied can be controlled by adjusting the gun traverse speed. Column 5, lines 10-20, column 3, lines 5-35 and column 4, lines 5-20. McCane also teaches that based on the material to be applied there is a critical velocity for application that is partly based on the nozzle standoff distance from the substrate surface. Column 3, lines 20-35.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn to use kinetic spraying as suggested by Tawfik in order to desirably embed particles in the plastic layer without overheating the substrate, because Rayburn teaches thermally spraying metal particles to be embedded in a plastic layer on a substrate, and Tawfik teaches that when spraying metal particles to be embedded, it is desirable to use kinetic spraying to replace thermal spraying in order to prevent overheating of the substrate. It would further have been obvious to modify Rayburn in view of Tawfik to use the kinetic spraying features taught by Van Steenkiste '796 with an expectation of providing a desirably kinetic sprayed coating, because Rayburn in view of Tawfik suggests using kinetic spraying to provide the sprayed metal and Van Steenkiste '796 provides a desirable form of kinetic spraying to apply metal particles. As to the further distance between the substrate and nozzle (claim 16) and traverse speed (claim 12), it would have been obvious to one of ordinary skill in the art to optimize the features when performing the process of Rayburn in view of Tawfik and Van Steenkiste '796 as suggested by McCane, because Van Steenkiste '796 provides spraying features for various sizes of particles and materials and McCane teaches that traverse speed in kinetic spraying can be adjusted to provide for a desirable coating thickness and nozzle standoff distance from the substrate should be based on the material to be sprayed, and one would perform routine experimentation to optimize the positioning and speeds for the specific materials and purposes used.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik, Van Steenkiste '796 and McCane as applied to claims 12-16, 18 and 20 above, and further in view of Kashirin et al (US 6402050).

Rayburn in view of Tawfik, Van Steenkiste '796 and McCane teach all the features of this claim except entering the particles in the flow of gas at a point in the diverging region.

However, Kashirin teaches that in the art of cold gas dynamic spraying (kinetic spraying) it is desirable to provide the particles into the flow of gas at a point in the diverging region in order to reduce wear on the nozzle. Column 3, lines 1-25 and column 2, lines 1-20 and figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796 and McCane to feed the particles into the diverging region as suggested by Kashirin with an expectation of providing a desirably less worn spray system because Rayburn in view of Tawfik, Van Steenkiste '796 and McCane suggest using a kinetic spraying process and Kashirin teaches when kinetic spraying it is desirable to provide the powder in the diverging region to prevent wear on the nozzle.

12. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik, Van Steenkiste '796 and McCane as applied to claims 12-16, 18 and 20 above, and further in view of Martyniak (US 4263341).

Rayburn in view of Tawfik, Van Steenkiste '796 and McCane teach all the features of these claims except the mask.

However, Martyniak teaches that it is well known to use a mask of stainless steel, for example, when applying a sprayed metal coating to a substrate to provide coating in a desired area. Column 5, lines 5-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796 and McCane to use a stainless steel mask as suggested by Martyniak with an expectation of providing coating to specifically desired areas because Rayburn in view of Tawfik , Van Steenkiste '796 and McCane suggest applying a sprayed metal to a substrate and Marytniak teaches that when applying a sprayed metal to a substrate it is desirable to use an applied mask when specific areas are to be sprayed and that a desirable mask for metal spray coating is made from stainless steel.

13. Claims 1-6, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn (US 3731354) in view of Tawfik et al (US 2004/0101738), Van Steenkiste (US 6623796) (hereinafter Van Steenkiste '796), Hathaway (US 2599710) and McCane et al (US 6592947).

Rayburn teaches a method of spray coating a substrate covered by a plastic type material. Column 1, lines 50-60. Rayburn teaches making a rolled capacitor made from a two side metallized plastic dielectic material with thin coating of plastic material applied to head of the metallized layers for holding the capacitor together. Column 1, lines 50-60. After the capacitor is rolled, the plastic covered ends are sprayed with a high velocity spray of molten metal, preferably aluminum, which embeds itself in the plastic coatings between the metallized layers so as to contact the surface as well as the ends of the electrodes, but does not substantially penetrate the dielectric strip substrate. Column 1, line 65 through column 2, line 10, column 7, line 65 through column 6, line 20 and figure 7. The metal spraying must be done at high velocity. Column 6, lines 5-10. This embedding in the plastic to the metal below would "remove" the plastic, as it would be, at the least, pushed out of the way of the metal in the area of application.

Claim 13: the particles can be aluminum. Column 6, lines 1-25.

Claim 14: the substrate can comprise electrical conductor material. Column 4, lines 40-60 (layers 14, 16).

Claim 15: the substrate can be a flexible electrical circuit. See column 5, lines 25-30 showing the flexibility of composite film 10.

Rayburn teaches all the features of these claims except the kinetic spraying and its features.

However, Tawfik teaches that when spraying metal particles into a substrate to be embedded, it is desirable to use either thermal spraying or cold gas dynamic

spraying (=kinetic spraying). See paragraphs [0014], [0016], [0022], [0043] and [0049]. The use of cold gas dynamic spraying prevents problems fromm overheating during coating from occurring. Paragraphs [0022] and [0049].

Van Steenkiste '796 notes that kinetic spraying and cold gas dynamic spraying are equivalent. Column 1, lines 20-30. Van Steenkiste '796 also provides a desirable method of kinetic spraying of metals. Column 2, lines 40-55. Particle sizes can be 250 microns in diameter or less. Column 2, lines 40-55. For spraying a supersonic nozzle having a converging region connected to a diverging region through a throat is provided. Figure 2 and column 3, line 45 through column 4, line 10. A flow of heated main gas is directed through the nozzle. Column 3, lines 40-55. The particles are entrained in the flow of the heated main gas and accelerated to a velocity sufficient to result in the particles impacting and adhering to the substrate. Column 2, lines 40-55. The particles can be metal. Column 4, lines 50-60. The velocity can be 300-1200 m/s. Column 5, lines 30-40. The gas temperature can be 1200 degrees F. Column 5, lines 50-55.

Hathaway teaches that when coating a substrate with sprayed metal, such as when making electrical wiring, it is known to apply a mask to both sides of the substrate to provide a pattern to be sprayed. See column 3, lines 40-70 and column 4, lines 10-25.

McCane teaches that when performing kinetic spraying, it is known that the thickness of the layer to be applied can be controlled by adjusting the gun traverse

speed. Column 5, lines 10-20, column 3, lines 5-35 and column 4, lines 5-20. McCane also teaches that based on the material to be applied there is a critical velocity for application that is partly based on the nozzle standoff distance from the substrate surface. Column 3, lines 20-35.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn to use kinetic spraying as suggested by Tawfik in order to desirably embed particles in the plastic layer without overheating the substrate, because Rayburn teaches thermally spraying metal particles to be embedded in a plastic layer on a substrate, and Tawfik teaches that when spraying metal particles to be embedded, it is desirable to use kinetic spraying to replace thermal spraying in order to prevent overheating of the substrate. It would further have been obvious to modify Rayburn in view of Tawfik to use the kinetic spraying features taught by Van Steenkiste '796 with an expectation of providing a desirably kinetic sprayed coating, because Rayburn in view of Tawfik suggests using kinetic spraying to provide the sprayed metal and Van Steenkiste '796 provides a desirable form of kinetic spraying to apply metal particles. It would further have been obvious to modify Rayburn in view of Tawfik and Van Steenkiste '796 to use the mask as suggested by Hathaway in order to provide coating to the specifically desired areas, because Rayburn in view of Tawfik and Van Steenkiste '~~386~~ 796 teach applying a sprayed metal to a substrate and Hathaway teaches that when applying sprayed metal to a substrate, it is desirable to use an applied mask when a specific area is desirable to be sprayed. As to the further distance

between the substrate and nozzle (claim 5) and traverse speed (claim 1), it would have been obvious to one of ordinary skill in the art to optimize the features when performing the process of Rayburn in view of Tawfik and Van Steenkiste '796 and Hathaway as suggested by McCane, because Van Steenkiste '796 provides spraying features for various sizes of particles and materials and McCane teaches that traverse speed in kinetic spraying can be adjusted to provide for a desirable coating thickness and nozzle standoff distance from the substrate should be based on the material to be sprayed, and one would perform routine experimentation to optimize the positioning and speeds for the specific materials and purposes used.

14. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik , Van Steenkiste '796, Hathaway and McCane as applied to claims 1-6, 9 and 11 above, and further in view of Kashirin et al (US 6402050).

Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and McCane teach all the features of this claim except entering the particles in the flow of gas at a point in the diverging region.

However, Kashirin teaches that in the art of cold gas dynamic spraying (kinetic spraying) it is desirable to provide the particles into the flow of gas at a point in the diverging region in order to reduce wear on the nozzle. Column 3, lines 1-25 and column 2, lines 1-20 and figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and McCane to feed the particles into the diverging region as suggested by Kashirin with an expectation of providing a desirably less worn spray system because Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and McCane suggest using a kinetic spraying process and Kashirin teaches when kinetic spraying it is desirable to provide the powder in the diverging region to prevent wear on the nozzle.

15. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and McCane as applied to claims 1-6, 9 and 11 above, and further in view of Martyniak (US 4263341).

Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and McCane teach all the features of these claims except the material of the mask.

However, Martyniak teaches that it is well known to use a mask of stainless steel, for example, when applying a sprayed metal coating to a substrate to provide coating in a desired area. Column 5, lines 5-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik ,Van Steenkiste '796 , Hathaway and McCane to use a stainless steel mask as suggested by Martyniak with an expectation of providing a desirable mask for coating, because Rayburn in view of Tawfik ,Van Steenkiste '796, Hathaway and McCane suggest applying a sprayed metal

to a substrate using a mask and Marytniak teaches a desirable mask for metal spray coating is made from stainless steel.

16. Claims 1-6, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn (US 3731354) in view of Tawfik et al (US 2004/0101738), Van Steenkiste et al (US 6283386) (hereinafter Van Steenkiste '386), Hathaway (US 2599710) and either (a) Elmoursi et al (US 2003/0219576), (b) Zhao et al (US 2005/0040260) or (c) Van Steenkiste et al (US 2004/0157000) (hereinafter Van Steenkiste '000).

As to rejections using Zhao et al and Van Steenkiste '000 only:The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Rayburn teaches a method of spray coating a substrate covered by a plastic type material. Column 1, lines 50-60. Rayburn teaches making a rolled capacitor made from a two side metallized plastic dielectic material with thin coating of plastic material applied to head of the metallized layers for holding the capacitor together. Column 1,

lines 50-60. After the capacitor is rolled, the plastic covered ends are sprayed with a high velocity spray of molten metal, preferably aluminum, which embeds itself in the plastic coatings between the metallized layers so as to contact the surface as well as the ends of the electrodes, but does not substantially penetrate the dielectric strip substrate. Column 1, line 65 through column 2, line 10, column 7, line 65 through column 6, line 20 and figure 7. The metal spraying must be done at high velocity. Column 6, lines 5-10. This embedding in the plastic to the metal below would "remove" the plastic, as it would be, at the least, pushed out of the way of the metal in the area of application.

Claim 2: the particles can be aluminum. Column 6, lines 1-25.

Claim 3: the substrate can comprise electrical conductor material. Column 4, lines 40-60 (layers 14, 16).

Claim 4: the substrate can be a flexible electrical circuit. See column 5, lines 25-30 showing the flexibility of composite film 10.

Rayburn teaches all the features of these claims except (1) the kinetic spraying and its features and (2) the mask and its features.

However, Tawfik teaches that when spraying metal particles into a substrate to be embedded, it is desirable to use either thermal spraying or cold gas dynamic spraying (=kinetic spraying). See paragraphs [0014], [0016], [0022], [0043] and [0049]. The use of cold gas dynamic spraying prevents problems from overheating during coating from occurring. Paragraphs [0022] and [0049].

Van Steenkiste '386 notes that kinetic spraying and cold gas dynamic spraying are equivalent. Column1, lines 15-25. Van Steenkiste '386 also provides a desirable method of kinetic spraying of metals. Column 1, lines 55-60. Particle sizes can be in excess of 100 microns, up to 106 microns. Column 2, lines 20-30 and column 5, lines 45-55. For spraying a supersonic nozzle having a converging region connected to a diverging region through a throat is provided. Figure 2 and column 3, lines 40-65. A flow of heated main gas is directed through the nozzle. Column 3, lines 30-40. The particles are entrained in the flow of the heated main gas and accelerated to a velocity sufficient to result in the particles impacting and adhering to the substrate. Column 1, line 55 through column 2, line 10. The particles can be aluminum. Column 5, lines 25-30. The velocity can be greater than 1000 m/s. Column 1, lines 60-68. The gas temperature can be 650 degrees C. Column 1, lines 60-68.

Hathaway teaches that when coating a substrate with sprayed metal, such as when making electrical wiring, it is known to apply a mask to both sides of the substrate to provide a pattern to be sprayed. See column 3, lines 40-70 and column 4, lines 10-25.

(a) Elmoursi teaches that when performing kinetic spraying the particle size can be 25 to 150 microns. Paragraphs [0009]-[0010] and [0021]. Elmoursi indicates the use of a traverse speed of 130 mm/sec, and its comparison with other speeds, and that in general thickness decreases traverse speed increases. Paragraph [0045]. The standoff

distance is also varied to show different thickness coating results, including a standoff of 44 mm. Paragraph [0046].

(b) Zhao teaches a kinetic spraying device. Paragraph [0006] - [0008]. The particle sizes can be 60 to 110 microns. Paragraph [0023]. Zhao shows deposition efficiency results for different traverse speeds, including 4 and 5 inches/sec (101 and 127 mm/sec, respectively) and desirable speeds. Paragraphs [0038] – [0039]. Zhao also teaches to control the standoff distance to 10 to 80 mm. Paragraph [0029].

(c) Van Steenkiste '000 teaches kinetic spraying with a traverse rate of desirably 30 to 50 feet/min (152-254 mm/sec, respectively). Paragraph [0021]. The particle size can be 63 to 90 microns. Paragraph [0030]. A standoff distance is desirably 10 to 40 mm. Paragraph [0028].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn to use kinetic spraying as suggested by Tawfik in order to desirably embed particles in the plastic layer without overheating the substrate, because Rayburn teaches thermally spraying metal particles to be embedded in a plastic layer on a substrate, and Tawfik teaches that when spraying metal particles to be embedded, it is desirable to use kinetic spraying to replace thermal spraying in order to prevent overheating of the substrate. It would further have been obvious to modify Rayburn in view of Tawfik to use the kinetic spraying features taught by Van Steenkiste '386 with an expectation of providing a desirably kinetic sprayed coating, because Rayburn in view of Tawfik suggests using kinetic spraying to provide the

sprayed metal and Van Steenkiste '386 provides a desirable form of kinetic spraying to apply metal particles. It would further have been obvious to modify Rayburn in view of Tawfik and Van Steenkiste '386 to use the mask as suggested by Hathaway in order to provide coating to the specifically desired areas, because Rayburn in view of Tawfik and Van Steenkiste '386 teach applying a sprayed metal to a substrate and Hathaway teaches that when applying sprayed metal to a substrate, it is desirable to use an applied mask when a specific area is desirable to be sprayed. As to the further distance between the substrate and nozzle (claim 5) and traverse speed (claim 1), it would have been obvious to one of ordinary skill in the art to optimize the features when performing the process of Rayburn in view of Tawfik and Van Steenkiste '386 and Hathaway as suggested by (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000, because Van Steenkiste '386 provides spraying features for various sizes of particles and materials and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teaches that traverse speed in kinetic spraying can be desirably in the claimed range and nozzle standoff distance from the substrate can be desirably within the claimed range.

17. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 as applied to claims 1-6, 9 and 11 above, and further in view of Martyniak (US 4263341).

Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teach all the features of this claim except the material of the mask.

However, Martyniak teaches that it is well known to use a mask of stainless steel, for example, when applying a sprayed metal coating to a substrate. Column 5, lines 5-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000to use a stainless steel mask as suggested by Martyniak with an expectation of providing a desirable mask for coating because Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 suggest using a mask when metal spray coating and Marytniak teaches that a desirable mask for metal spray coating is made from stainless steel.

18. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000as applied to claims 1-6, 9 and 11 above, and further in view of Kashirin et al (US 6402050).

Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teach all the features of this claim except entering the particles in the flow of gas at a point in the diverging region.

However, Kashirin teaches that in the art of cold gas dynamic spraying (kinetic spraying) it is desirable to provide the particles into the flow of gas at a point in the diverging region in order to reduce wear on the nozzle. Column 3, lines 1-25 and column 2, lines 1-20 and figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 to feed the particles into the diverging region as suggested by Kashirin with an expectation of providing a desirably less worn spray system because Rayburn in view of Tawfik , Van Steenkiste '386, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 suggest using a kinetic spraying process and Kashirin teaches when kinetic spraying it is desirable to provide the powder in the diverging region to prevent wear on the nozzle.

19. Claims 12-16, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn (US 3731354) in view of Tawfik et al (US 2004/0101738) , Van Steenkiste (US 6623796) (hereinafter Van Steenkiste '796) and either (a) Elmoursi et al (US 2003/0219576), (b) Zhao et al (US 2005/0040260) or (c) Van Steenkiste et al (US 2004/0157000) (hereinafter Van Steenkiste '000).

As to rejections using Zhao et al and Van Steenkiste '000 only:The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Rayburn teaches a method of spray coating a substrate covered by a plastic type material. Column 1, lines 50-60. Rayburn teaches making a rolled capacitor made from a two side metallized plastic dielectic material with thin coating of plastic material applied to head of the metallized layers for holding the capacitor together. Column 1, lines 50-60. After the capacitor is rolled, the plastic covered ends are sprayed with a high velocity spray of molten metal, preferably aluminum, which embeds itself in the plastic coatings between the metallized layers so as to contact the surface as well as the ends of the electrodes, but does not substantially penetrate the dielectric strip substrate. Column 1, line 65 through column 2, line 10, column 7, line 65 through column 6, line 20 and figure 7. The metal spraying must be done at high velocity. Column 6, lines 5-10. This embedding in the plastic to the metal below would "remove" the plastic, as it would be, at the least, pushed out of the way of the metal in the area of application.

Claim 13: the particles can be aluminum. Column 6, lines 1-25.

Claim 14: the substrate can comprise electrical conductor material. Column 4, lines 40-60 (layers 14, 16).

Claim 15: the substrate can be a flexible electrical circuit. See column 5, lines 25-30 showing the flexibility of composite film 10.

Rayburn teaches all the features of these claims except the kinetic spraying and its features.

However, Tawfik teaches that when spraying metal particles into a substrate to be embedded, it is desirable to use either thermal spraying or cold gas dynamic spraying (=kinetic spraying). See paragraphs [0014], [0016], [0022], [0043] and [0049]. The use of cold gas dynamic spraying prevents problems from overheating during coating from occurring. Paragraphs [0022] and [0049].

Van Steenkiste '796 notes that kinetic spraying and cold gas dynamic spraying are equivalent. Column 1, lines 20-30. Van Steenkiste '796 also provides a desirable method of kinetic spraying of metals. Column 2, lines 40-55. Particle sizes can be 250 microns in diameter. Column 2, lines 40-55. For spraying a supersonic nozzle having a converging region connected to a diverging region through a throat is provided. Figure 2 and column 3, line 45 through column 4, line 10. A flow of heated main gas is directed through the nozzle. Column 3, lines 40-55. The particles are entrained in the flow of the heated main gas and accelerated to a velocity sufficient to result in the particles impacting and adhering to the substrate. Column 2, lines 40-55. The particles can be

metal. Column 4, lines 50-60. The velocity can be 300-1200 m/s. Column 5, lines 30-40. The gas temperature can be 1200 degrees F. Column 5, lines 50-55.

(a) Elmoursi teaches that performing kinetic spraying. Paragraphs [0009]-[0010] and [0021]. Elmoursi indicates the use of a traverse speed of 130 mm/sec, and its comparison with other speeds, and that in general thickness decreases traverse speed increases. Paragraph [0045]. The standoff distance is also varied to show different thickness coating results, including a standoff of 44 mm. Paragraph [0046].

(b) Zhao teaches a kinetic spraying device. Paragraph [0006] - [0008]. Zhao shows deposition efficiency results for different traverse speeds, including 4 and 5 inches/sec (101 and 127 mm/sec, respectively) and desirable speeds. Paragraphs [0038] – [0039]. Zhao also teaches to control the standoff distance to 10 to 80 mm. Paragraph [0029].

(c) Van Steenkiste '000 teaches kinetic spraying with a traverse rate of desirably 30 to 50 feet/min (152-254 mm/sec, respectively). Paragraph [0021]. A standoff distance is desirably 10 to 40 mm. Paragraph [0028].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn to use kinetic spraying as suggested by Tawfik in order to desirably embed particles in the plastic layer without overheating the substrate, because Rayburn teaches thermally spraying metal particles to be embedded in a plastic layer on a substrate, and Tawfik teaches that when spraying metal particles to be embedded, it is desirable to use kinetic spraying to replace thermal spraying in

order to prevent overheating of the substrate. It would further have been obvious to modify Rayburn in view of Tawfik to use the kinetic spraying features taught by Van Steenkiste '796 with an expectation of providing a desirably kinetic sprayed coating, because Rayburn in view of Tawfik suggests using kinetic spraying to provide the sprayed metal and Van Steenkiste '796 provides a desirable form of kinetic spraying to apply metal particles. As to the further distance between the substrate and nozzle (claim 16) and traverse speed (claim 12), it would have been obvious to one of ordinary skill in the art to optimize the features when performing the process of Rayburn in view of Tawfik and Van Steenkiste '796 as suggested by (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000, because Van Steenkiste '796 provides spraying features for various sizes of particles and materials and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teaches that traverse speed in kinetic spraying can be desirably in the claimed range and nozzle standoff distance from the substrate can be desirably within the claimed range.

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 as applied to claims 12-16, 18 and 20 above, and further in view of Kashirin et al (US 6402050).

Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teach all the features of this claim except entering the particles in the flow of gas at a point in the diverging region.

However, Kashirin teaches that in the art of cold gas dynamic spraying (kinetic spraying) it is desirable to provide the particles into the flow of gas at a point in the diverging region in order to reduce wear on the nozzle. Column 3, lines 1-25 and column 2, lines 1-20 and figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 to feed the particles into the diverging region as suggested by Kashirin with an expectation of providing a desirably less worn spray system because Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 suggest using a kinetic spraying process and Kashirin teaches when kinetic spraying it is desirable to provide the powder in the diverging region to prevent wear on the nozzle.

21. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 as applied to claims 12-16, 18 and 20 above, and further in view of Martyniak (US 4263341).

Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teach all the features of these claims except the mask.

However, Martyniak teaches that it is well known to use a mask of stainless steel, for example, when applying a sprayed metal coating to a substrate to provide coating in a desired area. Column 5, lines 5-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 to use a stainless steel mask as suggested by Martyniak with an expectation of providing coating to specifically desired areas because Rayburn in view of Tawfik , Van Steenkiste '796 and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 suggest applying a sprayed metal to a substrate and Marytniak teaches that when applying a sprayed metal to a substrate it is desirable to use an applied mask when specific areas are to be sprayed and that a desirable mask for metal spray coating is made from stainless steel.

22. Claims 1-6, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn (US 3731354) in view of Tawfik et al (US 2004/0101738), Van Steenkiste (US 6623796) (hereinafter Van Steenkiste '796), Hathaway (US 2599710) and either (a) Elmoursi et al (US 2003/0219576), (b) Zhao et al (US 2005/0040260) or (c) Van Steenkiste et al (US 2004/0157000) (hereinafter Van Steenkiste '000).

As to rejections using Zhao et al and Van Steenkiste '000 only:The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived

from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Rayburn teaches a method of spray coating a substrate covered by a plastic type material. Column 1, lines 50-60. Rayburn teaches making a rolled capacitor made from a two side metallized plastic dielectic material with thin coating of plastic material applied to head of the metallized layers for holding the capacitor together. Column 1, lines 50-60. After the capacitor is rolled, the plastic covered ends are sprayed with a high velocity spray of molten metal, preferably aluminum, which embeds itself in the plastic coatings between the metallized layers so as to contact the surface as well as the ends of the electrodes, but does not substantially penetrate the dielectric strip substrate. Column 1, line 65 through column 2, line 10, column 7, line 65 through column 6, line 20 and figure 7. The metal spraying must be done at high velocity. Column 6, lines 5-10. This embedding in the plastic to the metal below would "remove" the plastic, as it would be, at the least, pushed out of the way of the metal in the area of application.

Claim 13: the particles can be aluminum. Column 6, lines 1-25.

Claim 14: the substrate can comprise electrical conductor material. Column 4, lines 40-60 (layers 14, 16).

Claim 15: the substrate can be a flexible electrical circuit. See column 5, lines 25-30 showing the flexibility of composite film 10.

Rayburn teaches all the features of these claims except the kinetic spraying and its features.

However, Tawfik teaches that when spraying metal particles into a substrate to be embedded, it is desirable to use either thermal spraying or cold gas dynamic spraying (=kinetic spraying). See paragraphs [0014], [0016], [0022], [0043] and [0049]. The use of cold gas dynamic spraying prevents problems fromm overheating during coating from occurring. Paragraphs [0022] and [0049].

Van Steenkiste '796 notes that kinetic spraying and cold gas dynamic spraying are equivalent. Column 1, lines 20-30. Van Steenkiste '796 also provides a desirable method of kinetic spraying of metals. Column 2, lines 40-55. Particle sizes can be 250 microns in diameter or less. Column 2, lines 40-55. For spraying a supersonic nozzle having a converging region connected to a diverging region through a throat is provided. Figure 2 and column 3, line 45 through column 4, line 10. A flow of heated main gas is directed through the nozzle. Column 3, lines 40-55. The particles are entrained in the flow of the heated main gas and accelerated to a velocity sufficient to result in the particles impacting and adhering to the substrate. Column 2, lines 40-55. The particles can be metal. Column 4, lines 50-60. The velocity can be 300-1200 m/s. Column 5, lines 30-40. The gas temperature can be 1200 degrees F. Column 5, lines 50-55.

Hathaway teaches that when coating a substrate with sprayed metal, such as when making electrical wiring, it is known to apply a mask to both sides of the substrate to provide a pattern to be sprayed. See column 3, lines 40-70 and column 4, lines 10-25.

(a) Elmoursi teaches that when performing kinetic spraying the particle size can be 25 to 150 microns. Paragraphs [0009]-[0010] and [0021]. Elmoursi indicates the use of a traverse speed of 130 mm/sec, and its comparison with other speeds, and that in general thickness decreases traverse speed increases. Paragraph [0045]. The standoff distance is also varied to show different thickness coating results, including a standoff of 44 mm. Paragraph [0046].

(b) Zhao teaches a kinetic spraying device. Paragraph [0006] - [0008]. The particle sizes can be 60 to 110 microns. Paragraph [0023]. Zhao shows deposition efficiency results for different traverse speeds, including 4 and 5 inches/sec (101 and 127 mm/sec, respectively) and desirable speeds. Paragraphs [0038] – [0039]. Zhao also teaches to control the standoff distance to 10 to 80 mm. Paragraph [0029].

(c) Van Steenkiste '000 teaches kinetic spraying with a traverse rate of desirably 30 to 50 feet/min (152-254 mm/sec, respectively). Paragraph [0021]. The particle size can be 63 to 90 microns. Paragraph [0030]. A standoff distance is desirably 10 to 40 mm. Paragraph [0028].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn to use kinetic spraying as suggested by Tawfik

in order to desirably embed particles in the plastic layer without overheating the substrate, because Rayburn teaches thermally spraying metal particles to be embedded in a plastic layer on a substrate, and Tawfik teaches that when spraying metal particles to be embedded, it is desirable to use kinetic spraying to replace thermal spraying in order to prevent overheating of the substrate. It would further have been obvious to modify Rayburn in view of Tawfik to use the kinetic spraying features taught by Van Steenkiste '796 with an expectation of providing a desirably kinetic sprayed coating, because Rayburn in view of Tawfik suggests using kinetic spraying to provide the sprayed metal and Van Steenkiste '796 provides a desirable form of kinetic spraying to apply metal particles. It would further have been obvious to modify Rayburn in view of Tawfik and Van Steenkiste '796 to use the mask as suggested by Hathaway in order to provide coating to the specifically desired areas, because Rayburn in view of Tawfik and Van Steenkiste '~~386~~ 796 teach applying a sprayed metal to a substrate and Hathaway teaches that when applying sprayed metal to a substrate, it is desirable to use an applied mask when a specific area is desirable to be sprayed. As to the further distance between the substrate and nozzle (claim 5) and traverse speed (claim 1), it would have been obvious to one of ordinary skill in the art to optimize the features when performing the process of Rayburn in view of Tawfik and Van Steenkiste '796 and Hathaway as suggested by (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000, because Van Steenkiste '796 provides spraying features for various sizes of particles and materials and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teaches that traverse

speed in kinetic spraying can be desirably in the claimed range and nozzle standoff distance from the substrate can be desirably within the claimed range.

23. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik , Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 as applied to claims 1-6, 9 and 11 above, and further in view of Kashirin et al (US 6402050).

Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teach all the features of this claim except entering the particles in the flow of gas at a point in the diverging region.

However, Kashirin teaches that in the art of cold gas dynamic spraying (kinetic spraying) it is desirable to provide the particles into the flow of gas at a point in the diverging region in order to reduce wear on the nozzle. Column 3, lines 1-25 and column 2, lines 1-20 and figure 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 to feed the particles into the diverging region as suggested by Kashirin with an expectation of providing a desirably less worn spray system because Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 suggest using a

kinetic spraying process and Kashirin teaches when kinetic spraying it is desirable to provide the powder in the diverging region to prevent wear on the nozzle.

24. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 as applied to claims 1-6, 9 and 11 above, and further in view of Martyniak (US 4263341).

Rayburn in view of Tawfik, Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 teach all the features of these claims except the material of the mask.

However, Martyniak teaches that it is well known to use a mask of stainless steel, for example, when applying a sprayed metal coating to a substrate to provide coating in a desired area. Column 5, lines 5-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rayburn in view of Tawfik, Van Steenkiste '796 , Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 to use a stainless steel mask as suggested by Martyniak with an expectation of providing a desirable mask for coating, because Rayburn in view of Tawfik ,Van Steenkiste '796, Hathaway and (a) Elmoursi, (b) Zhao or (c) Van Steenkiste '000 suggest applying a sprayed metal to a substrate using a mask and Marytniak teaches a desirable mask for metal spray coating is made from stainless steel.

Response to Arguments

25. Applicant's arguments with respect to claims 1-9, 11-18 and 20-22 have been considered but are moot in view of the new ground(s) of rejection.

As to the claimed traverse speed, the Examiner has cited the references to McCane, Elmoursi, Zhao or Van Steenkiste '000 as discussed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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